WHAT IS CLAIMED IS:

1. A device for microfluidic control comprising:

a) a conduit having a first end and a second end;

b) a first path in fluid flow contact with the conduit;

c) a second path in fluid flow contact with the conduit; and

d) a regulator that is moveable in the conduit, wherein

the regulator has an outer dimension that is larger than the first end and the second end so the regulator cannot pass out of the conduit; and

the regulator comprises a substantially elastic material having a structural component.

2. A device for microfluidic control according to Claim 1 wherein substantially elastic material having a structural component is a composite polymer formed from a composite mixture comprising one or more polymerizable precursor and one or more particulate filler.

3. A device for microfluidic control according to Claim 1 further comprising a substrate.

4. A device for microfluidic control according to Claim 1, 2, or 3 further comprising a third path in fluid flow contact with the conduit.

5. A device for microfluidic control according to Claim 1, 2, or 3 wherein there are a plurality of regulators that are moveable in the conduit, each regulator having an outer diameter that is larger than the first and second flow paths so the regulators cannot pass out of the conduit, and wherein each regulator is a substantially elastic material having a structural component.

6. A device according to Claim 2 wherein the composite mixture additionally comprises a photo-initiator.

7. A device according to Claim 6 wherein the photo-initiator is fluorinated.

8. A device according to Claim 6 wherein the photo-initiator is an aromatic ketone.

9. A device according to Claim 2 wherein the composite mixture additionally comprises a surfactant.

10. A device according to Claim 2 wherein the composite mixture comprises two or more polymerizable precursors.

11. A device according to Claim 2 wherein the polymerizable precursor is one or more fluorinated acrylate, or fluorinated methacrylate.

12. A device according to Claim 11 wherein at least one polymerizable precursor is a mono- or multi- functional perfluoropolyether acrylate, or a mono- or multi- functional perfluoropolyether methacrylate.

13. A device according to Claim 2 wherein at least one polymerizable precursor is a fluorescent monomer.

14. A device according to Claim 2 wherein the particulate filler is a surface treated particulate filler.

15. A device according to Claim 2 wherein the particulate filler is a polyhedral oligomeric silsesquioxane.

16. A device according to Claim 2 wherein the outer dimension of the particulate filler is less than about 1 micrometer.

17. A device according to Claim 2 wherein the particulate filler is sized to be no more than 50% of the size of the smallest flow path in the conduit.

18. A device according to Claim 2 wherein the regulator is substantially incompressible.

19. A device according to Claim 2 wherein the regulator has an optical property.

20. A device according to Claim 2 wherein the regulator has a substantially stable volume when exposed to a fluid.

21. A device according to Claim 2 wherein the inner dimension of the conduit is less than about 1 millimeter.

22. A device according to Claim 2 wherein the regulator is substantially cylindrically shaped and moveable in a back and forth motion within the conduit.

23. A device according to Claim 2 wherein the regulator is substantially toothed wheel shaped and rotationally moveable within the conduit.

24. A device according to Claim 2 wherein the regulator is formed in the conduit by the in situ polymerization of a composite mixture.

25. A device according to Claim 2 wherein the regulator is formed in the conduit by the in situ polymerization of the composite mixture with an energy source.

26. A device according to Claim 2 wherein the composite mixture further comprises a photo-initiator and the regulator is formed in the conduit by the in situ polymerization of the composite mixture with a radiating light source.

27. A system for microfluidic control comprising:

a) a plurality of conduits, each conduit having a first end and a second end;

b) a first path in fluid flow contact with one or more conduit;

c) a second path in fluid flow contact with one or more conduit; and

d) a plurality of regulators, each regulator being independently moveable in a separate conduit, wherein

each regulator has an outer diameter that is larger than the first end and the second end so each regulator cannot pass out of the conduit; and

each regulator comprises a substantially elastic material having a structural element.

28. A method of making a microfluidic control device according to Claim 2 comprising:

a) combining a polymerizable precursor and a particulate filler to form a composite mixture;

b) introducing the composite mixture into a conduit; and

c) exposing the conduit to an energy source to polymerize the composite mixture in situ thereby forming a regulator, wherein the regulator is movable in the conduit, and the conduit is sized so the regulator cannot pass out of the conduit.

29. A method according to Claim 28 wherein the composite mixture additionally comprises a photo-initiator and wherein the energy source is a radiating light source and the conduit is exposed to the radiating light source through a mask to form the regulator.

30. A method of making a device for microfluidic control comprising:

a) selecting a substrate having a plurality of conduits;

b) combining a polymerizable precursor and a particulate filler to form a composite mixture;

c) introducing the composite mixture into each conduit; and

d) exposing each conduit to an energy source to polymerize the composite mixture in situ thereby forming a plurality of regulators, wherein each regulator is movable in a conduit and each conduit is sized so the regulator cannot pass out of the conduit.

31. A method according to Claim 30 additionally comprising removing unpolymerized composite mixture from a conduit.

32. A method of making a device according to Claim 30 wherein the substrate has three or more conduits, and the composite mixture is introduced into three or more conduits to form three or more regulators on the same substrate.

33. A method of making device according to Claim 30 wherein the energy source is a radiating light source and one or more conduits is exposed to the radiating light source to

form one or more substantially cylindrically shaped regulators, and each substantially cylindrically shaped regulator is moveable in a back and forth motion within the conduit.

34. A method of making a device according to Claim 30 wherein the energy source is a radiating light source and one or more conduits is exposed to the radiating light source to form one or more substantially toothed wheel shaped regulators, and each substantially toothed wheel shaped regulator is rotationally moveable within the conduit.

35. A method of making a device according to Claim 30 wherein the device comprises two or more conduits and two or more regulators and the energy source is a radiating light source and each conduit is exposed to the radiating light source to form a regulator within each conduit.

36. A method of making a device according to Claim 29 wherein the substrate has an axle, and the conduit is exposed to a radiating light to form a substantially toothed wheel shaped regulator around the axle.

37. A method for determining a fluid flow rate in a microfluidic device comprising:

a) selecting a device for microfluidic control, the device having one or more regulators that are moveable in the conduit,

b) moving a fluid with a viscosity past a regulator, thereby moving one or more regulators at a fluid flow rate;

c) directing a radiating light to a portion of one or more regulators such that the radiating light is reflected or transmitted to a detector;

d) measuring the reflected or transmitted light as a periodic signal in time; and

e) processing the signal;

f) determining the frequency of the signal and relating the signal frequency to the fluid flow rate.

38. A method according to Claim 37 wherein the radiating light is reflected or transmitted to a plurality of detectors.

39. A method according to Claim 37 wherein a plurality of radiating lights are directed to a regulator and the radiating lights are reflected or transmitted to a plurality of detectors.

40. A method according to Claim 37 wherein at least one of the regulators is a substantially toothed wheel shaped regulator and the radiating light is directed to a toothed portion of the regulator such that the radiating light is reflected or transmitted to a detector.